PATENT ABSTRACTS OF JAPAN

(11)Publication number : 09-309923
(43)Date of publication of application : 02.12.1997

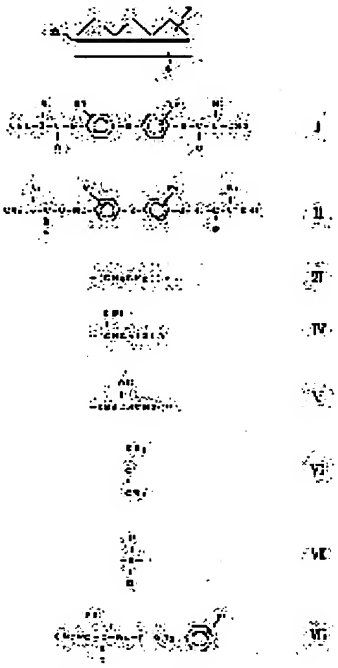
(51)Int.Cl. C08F 20/38
C08F 20/10
C08F290/06
C08F290/06
G02B 1/04
G02B 5/02
G02F 1/1335

(21)Application number : 08-128848
(22)Date of filing : 23.05.1996

(71)Applicant : MITSUBISHI RAYON CO LTD
(72)Inventor : FUKUSHIMA HIROSHI
KONAMI YUKICHI

(54) ACTINIC-RADIATION-CURING COMPOSITION, LENS SHEET AND BACKLIGHT

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an actinic-radiation-curing composition which can give lenses suppressed in a decrease in light transmittance and an increase in surface reflection and having improved balance among properties such as refractive index, transparency and strengths by mixing three specified compounds with an actinic-radiation-sensitive radical polymerization initiator.
SOLUTION: A lens sheet 1 is composed of a transparent base 8 and a lens part 9 made from an actinic-radiation-curing composition and formed on either surface of the base 8, and the refractive index of the base 8 is lower than that of the part 9. The curing composition comprises 20-80wt.% compound (A) represented by formula I (wherein R1 is H or methyl; X and Y are each methyl or a halogen; and (t) and (u) are each 0-2), 10-75wt.% compound (B) represented by formula II [wherein R2 is H or methyl; R3 is any one of groups of formulas III to V (wherein (m) and (n) are each 0-7); V and W are each methyl or a halogen; Z is -CH2-, -S-, a group of formula VI or VII; and (p) and (q) are each 0-2], 1-50wt.% compound (C) represented by formula VIII (wherein R4 is H or methyl; R5 is a 2-5 C hydrocarbon group; G is H, phenyl or halogen; and (i) is 1-5) and 0.01-5 pts.wt., per 100 pts.wt. total of components A to C, polymerization initiator (D).



LEGAL STATUS

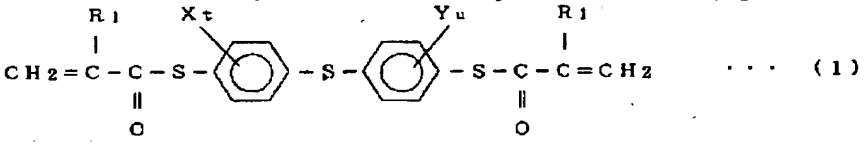
[Date of request for examination] 05.12.2002
[Date of sending the examiner's decision of rejection]
[Kind of final disposal of application other than the examiner's decision of rejection or withdrawal

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

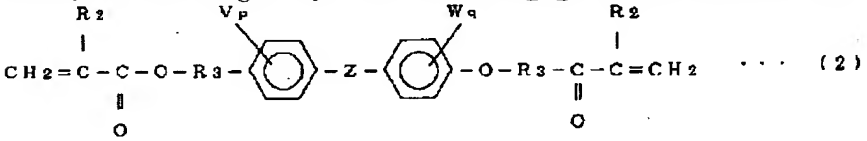
CLAIMS

[Claim(s)]
[Claim 1] (A) It is [20 - 80 % of the weight, and] [Formula 1] about at least one sort of the compound shown by the following general formula (1).



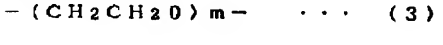
(1)

(R1 shows hydrogen or a methyl group among a formula, X and Y show either a methyl group, chlorine, a bromine or iodine, and t and u are the integers of 0-2.)
(B) It is [10 - 75 % of the weight, and] [Formula 2] about at least one sort of the compound shown by the following general formula (2).



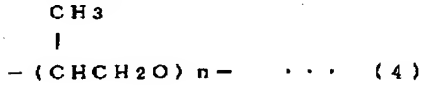
(2)

(the inside of a formula, and R2 -- hydrogen or a methyl group -- in R3, V and W show either a methyl group, chlorine, a bromine or iodine, Z shows -CH2-, -S-, the following formula (6), or either of (7) for either of following formula (3) - (5), and p and q are the integers of 0-2.)
[Formula 3]



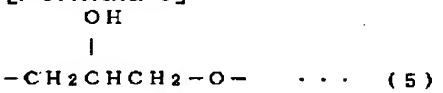
(3)

(m is the integer of 0-7 among a formula.)
[Formula 4]



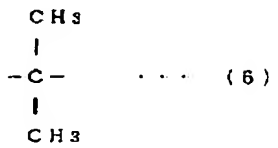
(4)

(n is the integer of 0-7 among a formula.)
[Formula 5]



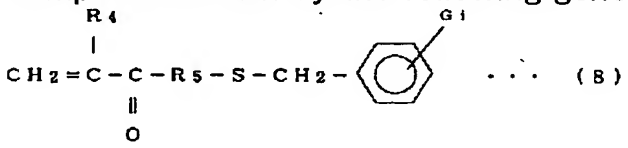
(5)

[Formula 6]



[Formula 7]

(C) It is [1 - 50 % of the weight, and] [Formula 8] about at least one sort of the compound shown by the following general formula (8).



(Among a formula, R5 shows hydrogen or a methyl group, a hydrocarbon group the straight chain mold of carbon numbers 2-5 or branch-type and G show either hydrogen, a phenyl group, chlorine, a bromine or iodine in R4, and i is the integer of 1-5.)

(D) The activity energy-line hardenability constituent characterized by containing 0.01 - 5 weight section for an activity energy-line sensitivity radical polymerization initiator to the total quantity 100 weight section of (A) - (C) component.

[Claim 2] The lens sheet characterized by forming the lens section in one [at least] front face of a transparence base material with the activity energy-line hardenability constituent of claim 1.

[Claim 3] The back light characterized by consisting of tabular transparent materials which have at least one plane of incidence and the outgoing radiation side which counter the light source and this light source, and laying the lens sheet of claim 2 in the outgoing radiation side side of a transparent material.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the activity energy-line hardenability constituent which constitutes the lens section of the back light using lens sheets, such as a prism sheet used for a projection screen or stereographs, such as back lights, such as a liquid crystal display, a display board, and a signboard, projection TV, and a micro FIEUMU reader, etc., a Fresnel lens sheet, and a lenticular lens sheet, and such a lens sheet, and a lens sheet.
[0002]
[Description of the Prior Art] What formed the lens section using activity energy-line hardenability constituents, such as an ultraviolet-rays hardenability constituent, has been used from viewpoints, such as the precise imprint nature of a lens pattern, and productivity, as lens sheets, such as a lenticular lens sheet used for the Fresnel lens sheet with which projection screens used for back lights, such as a liquid crystal display, such as a prism sheet, a lenticular lens sheet, projection TV, and a microfilm reader, are also used, a lenticular lens sheet, a stereograph, etc. The lens section to which such a lens sheet consists of a hardened material of an activity energy-line hardenability constituent on transparence base materials, such as for example, a transparence resin film and a transparence resin sheet, is formed in one. As an activity energy-line hardenability constituent used in order to form the lens section of such a lens sheet, various properties, such as adhesion with a transparence base material, detachability with a lens mold, and an optical property as a lens sheet, are required.
[0003] For example, in dc-battery drive products, such as a portable notebook computer equipped with the color liquid crystal display, and the portable liquid crystal TV using an electrochromatic display panel or the video one apparatus liquid crystal TV, it has been a failure for the power consumption of a liquid crystal display to develop dc-battery drive time amount. The rate of the power consumption of the back light used for the liquid crystal display especially is large, and when stopping this power consumption as low as possible develops dc-battery drive time amount and it raises practical use worth of the above-mentioned product, it considers as the important technical problem. However, by having reduced the brightness of a back light, a liquid crystal display becomes hard to see and is not desirable by stopping the power consumption of a back light. Then, in

order to stop power consumption, without sacrificing the brightness of a back light and to improve the optical effectiveness of a back light, the back light which laid the lens sheet which formed many lens trains, such as a prism train and a lenticular train, in one side in the outgoing radiation side side of a transparent material is proposed.

[0004]

[Problem(s) to be Solved by the Invention] As such a lens sheet, the lens train was formed in the front face of the sheet which consists of thermoplastic transparence resin, such as polymethylmethacrylate and a polycarbonate, by press working of sheet metal, and the lens sheet which formed the lens train in the front face of transparence sheets, such as polyester and a polycarbonate, with activity energy-line hardenability constituents, such as ultraviolet rays, was used. However, with the lens sheet which formed the lens train in the front face of the sheet which consists of thermoplastic transparence resin by press working of sheet metal, it was difficult to balance a refractive index, transparency, a surface reflection factor, and reinforcement, and it was not what can attain improvement in sufficient transverse-plane brightness.

[0005] Moreover, it is used in order for a lens sheet to raise transverse plane brightness by turning outgoing radiation light in the direction of a transverse plane for the outgoing radiation light from a transparent material according to a refraction operation and to raise the optical effectiveness of a back light, and in order to depend for the improvement effectiveness of the transverse plane brightness on the refractive index of a lens sheet, forming the lens section of a lens sheet using an activity energy line hardenability constituent with a high refractive index is proposed. However, since light transmission became low or the surface reflection factor of incident light became high when an ingredient with a high refractive index is used, it was not necessarily what can attain improvement in sufficient transverse-plane brightness.

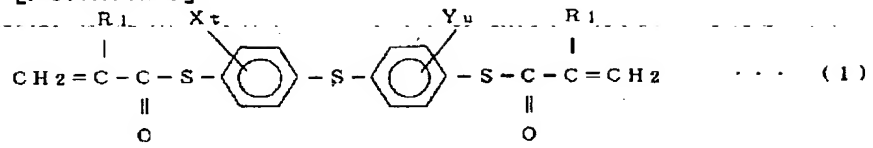
[0006] Then, the purpose of this invention is to control decline in the light transmission as a lens sheet, and the increment in a surface reflection factor, offer the activity energy-line hardenability constituent excellent in a refractive index, transparency, and the balance nature of a surface reflection factor or reinforcement, and offer the high lens sheet and high back light of transverse-plane brightness.

[0007]

[Means for Solving the Problem] this invention person etc. results that the high lens sheet and high back light of transverse-plane brightness are obtained in a header and this invention, without excelling in a refractive index, transparency, and the balance nature of a surface reflection factor or reinforcement, and causing decline in light transmission, and the increment in a surface reflection factor in view of the trouble of the above conventional back lights, by constituting the lens section of a lens sheet with a specific activity energy-line hardenability constituent.

[0008] That is, the activity energy-line hardenability constituent of this invention is at least one sort of the compound shown by the (A) following general formula (1) 20 - 80 % of the weight, and [0009]

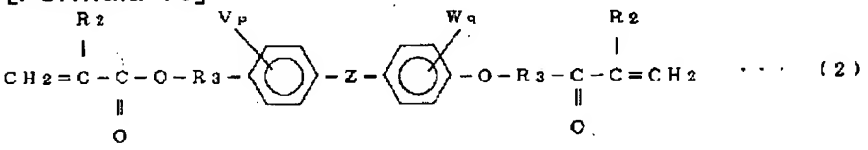
[Formula 9]



[0010] (R1 shows hydrogen or a methyl group among a formula, X and Y show either a methyl group, chlorine, a bromine or iodine, and t and u are the integers of 0-2.)

(B) It is at least one sort of the compound shown by the following general formula (2) 10 - 75 % of the weight, and [0011]

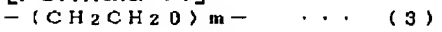
[Formula 10]



[0012] (the inside of a formula, and R2 -- hydrogen or a methyl group -- in R3, V and W show either a methyl group, chlorine, a bromine or iodine, Z shows -CH2-, -S-, the following formula (6), or either of (7) for either of following formula (3) - (5), and p and q are the integers of 0-2.)

[0013]

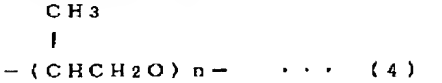
[Formula 11]



[0014] (m is the integer of 0-7 among a formula.)

[0015]

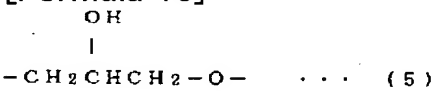
[Formula 12]



[0016] (n is the integer of 0-7 among a formula.)

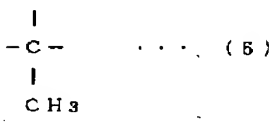
[0017]

[Formula 13]



[0018]

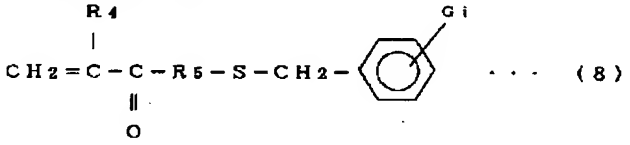
[Formula 14]



[0019]

[Formula 15]

[0020] (C) It is at least one sort of the compound shown by the following general formula (8) 1 - 50 % of the weight, and [0021]
[Formula 16]



[0022] (Among a formula, R5 shows hydrogen or a methyl group, a hydrocarbon group the straight chain mold of carbon numbers 2-5 or branch-type and G show either hydrogen, a phenyl group, chlorine, a bromine or iodine in R4, and i is the integer of 1-5.)
(D) It is characterized by containing 0.01 - 5 weight section for an activity energy-line sensitivity radical polymerization initiator to the total quantity 100 weight section of (A) - (C) component.
[0023] Moreover, the lens sheet of this invention is characterized by forming the lens section in one [at least] front face of a transparence base material with the above activity energy-line hardenability constituents. Furthermore, the back light of this invention consists of tabular transparent materials which have at least one plane of incidence and the outgoing radiation side which counter the light source and this light source, and is characterized by laying the above lens sheets in the outgoing radiation side side of a transparent material.
[0024]
[Embodiment of the Invention] The activity energy-line hardenability constituent of this invention fits the lens sheet of the prism sheet 1 grade used for the back light shown in drawing 1 . Especially the activity energy-line hardenability constituent of this invention constitutes the lens section 9 in the lens sheet 1 which the lens section 9 is formed in one [at least] field of the transparence sheet 8, and becomes, as shown in drawing 2 . The activity energy-line hardenability constituent of this invention is a constituent which comes to contain the component of following (A) - (D).
[0025] The (A) component used for the activity energy-line hardenability constituent of this invention is a compound shown by said general formula (1), and is a component for raising a refractive index, without reducing the transparency of the hardened material of an activity energy-line hardenability constituent. As an example of the compound shown by said general formula (1) A screw (4-methacryloyl thiophenyl) sulfide, a screw (4-acryloyl thiophenyl) sulfide, A screw (4-methacryloyl thio -3, 5-dichlorophenyl) sulfide, A screw (4-acryloyl thio -3, 5-dichlorophenyl) sulfide, A screw (4-methacryloyl thio -3, 5-dibromo phenyl) sulfide, A screw (4-acryloyl thio -3, 5-dibromo phenyl) sulfide, A screw (4-methacryloyl thio -3, 5-dimethylphenyl) sulfide, a screw (4-acryloyl thio -3, 5-dimethylphenyl) sulfide, etc. are mentioned, and especially a screw (4-methacryloyl thiophenyl)

sulfide is desirable especially. These may use one sort independently and can also use it combining two or more sorts.
[0026] In this invention, the (A) component is used in 20 - 80% of the weight of the range into the (A) - (B) component, and is 30 - 60% of the weight of the range preferably [it is desirable and] to 25 - 70% of the weight of the range, and a pan. This is in the inclination for the refractive index of the lens section of a lens sheet to fall that the (A) component is less than 20 % of the weight. When it is because the improvement effectiveness in brightness by the lens sheet cannot fully be attained and exceeds 80 % of the weight conversely, while the transparency and the mechanical strength of the lens section fall or being in the inclination for the impregnation workability to a lens mold to fall It is because a deposit of the (A) component which is a solid-state takes place in ordinary temperature during storage and it is in a lifting or a cone inclination about presentation change.
[0027] It is a compound shown by said general formula (2), and the (B) component used for the activity energy-line hardenability constituent of this invention is a component for raising a mechanical strength while it raises the refractive index of the SENZU section formed from the activity energy-line hardenability constituent. Since it is required to imprint the lens configuration of the lens section precisely and to make the thickness uniform in case the allocated type of the lens section is carried out using the activity energy-line hardenability constituent of this invention, as a (B) component, it is a liquid in ordinary temperature, and what has low viscosity is desirable. Moreover, as for the (B) component, what can dissolve efficiently the (A) component which is a solid-state in ordinary temperature is desirable.
[0028] As an example of the compound shown by said general formula (2) A 2 and 2-screw (4-(meth)acryloyloxy phenyl)-propane, A 2 and 2-screw (4-(meth) acryloyloxy ethoxy phenyl)-propane, A 2 and 2-screw (4-(meth)acryloyloxy diethoxy phenyl)-propane, A 2 and 2-screw (4-(meta) acryloyl OKISHITORI ethoxy phenyl)-propane, A 2 and 2-screw (4-(meth)acryloyloxy tetra-ethoxy phenyl)-propane, 2,2-bis(4-(meta)acryloiloxypentaethoxyphenil)-propane, 2 and 2-screw (4-(meta) acryloyl oxyethoxy -3, 5-dibromo phenyl) propane, 2 and 2-screw (4-(meth)acryloyloxy diethoxy -3, 5-dibromo phenyl) propane, 2 and 2-screw (4-(meth)acryloyloxy pentaethoxy -3, 5-dibromo phenyl) propane, Screw (4-(meth) acryloyloxy ethoxy phenyl)-methane, Screw (4-(meth)acryloyloxy diethoxy phenyl)-methane, Screw (4-(meth)acryloyloxy diethoxy phenyl)-sulfone, Bis(4-(meta)acryloiloxypentaethoxyphenil)-sulfon, A screw (4-(meth)acryloyloxy diethoxy phenyl)-sulfide, A screw (4-(meth)acryloyloxy pentaethoxy phenyl)-sulfide, A screw (4-(meth)acryloyloxy diethoxy -3, 5-dimethylphenyl)-sulfide, Ester monomers, such as a screw (4-(meth)acryloyloxy pentaethoxy -3, 5-dimethylphenyl)-sulfide, The reactant of the bisphenol A mold epoxy compound and a methacrylic acid, the reactant of a bromination bisphenol A mold epoxy compound and a methacrylic acid, The reactant of a bisphenol female mold epoxy compound and a methacrylic acid, the reactant of a bisphenol smooth S form epoxy compound and a methacrylic acid, etc. are mentioned. These may use one sort independently and can also use it combining two or more sorts.
[0029] Also in these (B) components, 2,2-bis(4-methacryloyloxyethoxyphenyl)

propane, A 2 and 2-screw (4-acryloyloxy ethoxy phenyl)-propane, A 2 and 2-screw (4-methacryloyloxy diethoxy phenyl)-propane, A 2 and 2-screw (4-acryloyloxy diethoxy phenyl)-propane, A 2 and 2-screw (4-methacryloyl OKISHITORI ethoxy phenyl)-propane, A 2 and 2-screw (4-acryloyl OKISHITORI ethoxy phenyl)-propane, A 2 and 2-screw (4-methacryloyloxy tetra-ethoxy phenyl)-propane, A 2 and 2-screw (4-acryloyloxy tetra-ethoxy phenyl)-propane, A 2 and 2-screw (4-methacryloyloxy pentaethoxy phenyl)-propane, A 2 and 2-screw (4-acryloyloxy pentaethoxy phenyl)-propane, the reactant of the bisphenol A mold epoxy compound and a methacrylic acid, and especially the reactant of a bromination bisphenol A mold epoxy compound and a methacrylic acid are desirable.

[0030] In this invention, the (B) component is used in 10 - 75% of the weight of the range into the (A) - (C) component, and is 20 - 50% of the weight of the range preferably [it is desirable and] to 15 - 70% of the weight of the range, and a pan. This is because a deposit of the (A) component which is a solid-state takes place in ordinary temperature during storage and it is in a lifting or a cone inclination about presentation change with inclination **** to which the transparency and the mechanical strength of the lens section of a lens sheet fall that the (B) component is less than 10 % of the weight. On the contrary, when the (B) component exceeds 75 % of the weight, it is because it is in the inclination for the refractive index of the lens section of a lens sheet to fall and the improvement effectiveness in brightness by the lens sheet cannot fully be attained.

[0031] The (C) component used for the activity energy-line hardenability constituent of this invention is a compound shown by said general formula (8), and is a component for adjusting viscosity, a refractive index, etc. of an activity energy-line hardenability constituent. In case the allocated type of the lens section is carried out using the activity energy-line hardenability constituent of this invention, considering the impregnation workability to a lens mold, and a lens configuration as a (C) component from viewpoints, such as imprint nature and the thickness control nature of the lens section, it is a liquid in ordinary temperature, and what has low viscosity is desirable. Moreover, as for the (C) component, what was excellent in the solubility of the (A) component which is a solid-state with ordinary temperature, and what has the large effectiveness which raises the refractive index of the lens section to form are desirable.

[0032] As an example of the compound shown by said general formula (8) Benzyl thio ethyl (meta) acrylate, benzyl thio propyl (meta) acrylate, Benzyl thio-1-methylethyl (meta) acrylate, benzyl thio-2-methylethyl (meta) acrylate, Benzyl thio butyl (meta) acrylate, benzyl thio-1-methylpropyl (meta) acrylate, Benzyl thio-3-methylpropyl (meta) acrylate, benzyl thio pentyl (meta) acrylate, The benzyl thio - 2, 2-dimethyl propyl (meta) acrylate, 2-(4'-chloro benzyl thio) ethyl (meta) acrylate, 2-(4'-chloro benzyl thio) propyl (meta) acrylate, 2-(4'-chloro benzyl thio)-1-methylethyl (meta) acrylate, 2-(4'-chloro benzyl thio)-2-methylethyl (meta) acrylate, 2-(4'-chloro benzyl thio) butyl (meta) acrylate, 2-(4'-chloro benzyl)-1-methylpropyl (meta) acrylate, 2-(4'-chloro benzyl)-3-methylpropyl (meta) acrylate, 2-(4'-chloro benzyl) pentyl (meta) acrylate, 2-(4'-chloro benzyl)-2, and 2-dimethyl propyl (meta) acrylate etc. is mentioned. Benzyl thio ethyl methacrylate, benzyl

thio ethyl acrylate, 2-(4'-chloro benzyl thio) ethyl methacrylate, and especially 2-(4'-chloro benzyl thio) ethyl acrylate are desirable especially. These may use one sort independently and can also use it combining two or more sorts.
[0033] in this invention, the (C) component is used in 1 - 50% of the weight of the range into the (A) - (C) component -- having -- desirable -- 5 - 45% of the weight of the range -- it is 10 - 40% of the weight of the range more preferably. This is in the inclination that the viscosity or the refractive index of an activity energy-line hardenability constituent cannot fully be adjusted as the (C) component is less than 1 % of the weight. And the adhesion of a transparence base material and the lens section falls, or [that the impregnation workability to a lens mold falls] It is because it is in the inclination which cannot fully raise a refractive index, and is because it is in the inclination for the refractive index and mechanical strength of the lens section which were formed when it exceeded 50 % of the weight conversely to fall, or for the adhesion of a transparence base material and the lens section to fall. Without reducing the transparency of a hardened material by using the above (A) - (C) components together, the activity energy-line hardenability constituent of this invention can raise a refractive index, productivity's can improve, and is suitable as an ingredient which constitutes the lens section of lens sheets, such as a prism sheet, a Fresnel lens sheet, and a lenticular lens sheet, especially.
[0034] If it is the compound which induces the activity energy line represented by ultraviolet rays etc. as an activity energy-line sensitivity radical polymerization initiator (D) used for the activity energy-line hardenability constituent of this invention, and generates a radical, it is not limited especially and a well-known polymerization initiator can be used. As an example of a component, (D) A benzoin, the benzoin monomethyl ether, Benzoin iso-propyl ether, acetoin, benzyl, a benzophenone, Benzyl dimethyl ketal, p-methoxybenzophenone, a diethoxy acetophenone, 2 and 2-dimethoxy -1, 2-bibenzyl-1-ON, 2, and 2-diethoxy acetophenone, 1-hydroxy cyclohexyl phenyl ketone, methylphenylglyoxylate, Ethyl phenylglyoxylate, 2-hydroxy - 2-methyl-1-phenyl propane-1-ON, 2-methyl-1-(4-(methylthio) phenyl)- the carbonyl compound of 2-morpholino propanone-1 grade -- Sulfur compounds, such as tetramethylthiurammonosulfide and tetramethylthiuramdisulfide, 2; 4, 6-trimethyl benzoyl diphenyl phosphine oxide, Screw (2, 6-dimethoxybenzoyl) - Acyl phosphine oxide, such as 2, 4, and 4-trimethyl pentyl phosphine oxide, A camphor quinone, a screw (cyclopentadienyl)-screw (the radical polymerization initiator of visible-ray sensitivity of 2 and 6-difluoro-3-(pill-1-IRU) titanium etc. is mentioned.) These may use one sort independently and can also use it combining two or more sorts.
[0035] Especially, it is benzyl dimethyl ketal, 2, and 2-dimethoxy. - 1 and 2-bibenzyl-1-ON, 1-hydroxy cyclohexyl phenyl ketone, methylphenylglyoxylate, 2-hydroxy - 2-methyl-1-phenyl propane-1-ON, 2 and 4, 6-trimethyl benzoyl diphenyl phosphine oxide, screw (2, 6-dimethoxybenzoyl) - Especially 2, 4, and 4-trimethyl pentyl phosphine oxide is desirable. In this invention, the (D) component is used in the range of 0.01 - 5 weight section to the total quantity 100 weight section of (A) - (C) component, and is the range of 0.02 - 3 weight section preferably. This is because it is in the inclination which the lens section formed when the (D)

component tends to turn into that under the 0.01 weight section of the hardenability of an activity energy-line hardenability constituent is inadequate and exceeded 5 weight sections conversely yellows.

[0036] The solubility of the (A) component can be raised in the activity energy-line hardenability constituent of this invention besides the above (A) - (D) component, or monofunctional [of aliphatic series, an alicycle group, and an aromatic series frame] or a polyfunctional (meta) acrylate compound, and the compound that has other radical polymerization functional groups can also be used for it for the purpose of raising adhesion with a transparence base material within limits which do not spoil the effectiveness of this invention. For example, phenyl (meta) acrylate, benzyl (meta) acrylate, Phenoxy ethyl (meta) acrylate, a 2-(4-(meth) acryloyloxy ethoxy phenyl)-2-phenyl-propane, The screw (4-(meta) acryloyloxyethyl thio) xylylene, 1, 6-hexane JIORUJI (meta) acrylate, Acrylic ester, such as TORIMECHI roll pro pantry (meta) acrylate (meta), The urethane poly (meta) acrylate compounded from hydronalium KISHIRUKI content (meta) acrylic ester and the poly isocyanate, Styrene, a divinylbenzene, chloro styrene, dibromo styrene, 2 -(4-vinylbenzyl thio)- Fumaric-acid derivatives, such as allyl compounds, such as styrene, such as ethanol, diallyl phthalate, and a diethylene-glycol screw (allyl carbonate), dibenzyl fumarate, and dibutylfumarate, etc. are mentioned. furthermore, the need -- responding -- an anti-oxidant and yellowing -- various additives, such as an inhibitor, an ultraviolet ray absorbent, a bluing acid, a pigment, a sedimentation inhibitor, a defoaming agent, an antistatic agent, and an antifogger, can also be used.

[0037] The lens sheet 1 of this invention consists of a transparence base material 8 and the lens section 9 formed in the field of one [at least] of these with the above activity energy-line hardenability constituents, as shown in drawing 2 . Although it will not be limited especially if the transparence base material 8 which constitutes the lens sheet 1 is an ingredient which penetrates activity energy lines, such as ultraviolet rays and an electron ray, but a flexible glass plate etc. can also be used, transparence resin sheets and films, such as polyester system resin, acrylic resin, polycarbonate system resin, vinyl chloride system resin, and poly methacrylic imide system resin, are desirable. What a refractive index is low and consists of polyester system resin, such as mixture of polymethylmethacrylate with a low surface reflection factor, polymethyl acrylate, and polyvinylidene fluoride system resin, polycarbonate system resin, and polyethylene terephthalate, rather than the refractive index of the lens section 9 especially is desirable. Although the thickness of the transparence base material 8 changes also with the applications, the thing of the range of 100 micrometers - about 5mm is used. In the lens sheet 1 especially used for a back light, the transparence base material 8 with a thickness of about 100-500 micrometers is suitable. In addition, in order to raise the adhesion of the lens section 9 and the transparence base material 8 which were formed with the activity energy-line hardenability constituent to the transparence base material 8, it is desirable to form the anchor coat processing layer 10 in the front face.

[0038] In the lens sheet 1 of this invention, various lens sides in which many lenticular lenses, such as the shape of the Fresnel lens side in which the prism

side in which many prism trains were formed in parallel, the linear, or the SAIKYURA Fresnel lens was formed, the shape of a cross-section semicircle, and a half-ellipse, were formed in parallel, such as a lenticular lens side and a corrugated lens side, are formed in the lens section 9 formed in the front face of the transparence base material 8 according to the purpose. These lens side can also form the same or a different lens side in both the front faces of the transparence base material 8. Moreover, as for the pitch of about 10-500 micrometers and a lens train, in the lens sheet 1 of this invention, it is [the thickness of the lens section 9] desirable to be referred to as 30 micrometers - about 0.5mm. Furthermore, in the prism sheets 1 of **, such as a back light, although the vertical angle of the prism train 2 changes also with use gestalten of the prism sheet 1, it is desirable to consider as within the limits of 50-150 degrees. As for the lens section 9 formed from the activity energy-line hardenability constituent, what has a high refractive index from points, such as compaction of the projector distance for improvement in the brightness of a back light and miniaturization of projection TV, is desirable, and, specifically, the refractive index is 1.63 or more still more preferably 1.60 or more.

[0039] The lens sheet 1 of this invention is manufactured by using the above activity energy-line hardenability constituents, and forming the lens section 9 on the transparence base materials 8, such as a bright film or a sheet. First, activity energy-line hardening mold resin liquid is poured into the lens mold in which the predetermined lens pattern was formed, and a transparence base material is piled up. Subsequently, activity energy lines, such as ultraviolet rays and an electron ray, are irradiated through the transparence base material 8, polymerization hardening of the activity energy-line hardenability constituent is carried out, it exfoliates from a lens mold, and the lens sheet 1 is obtained. That with which plastic patterns, such as the mold of metal [mold / in which the lens pattern was formed / lens], such as aluminum, brass, and copper, silicon resin, urethane resin, an epoxy resin, ABS plastics, a fluororesin, and poly methyl pentene resin, etc. mixed what was used and plated to these, and a metal powder is used. As the activity energy-line luminescence light source, the chemical lamp for chemical reactions, a low-pressure mercury lamp, a high-pressure mercury lamp, a metal halide lamp, a light halogen lamp, etc. are used. As an exposure of an activity energy line, addition energy with a wavelength of 200-600nm is 0.1 - 50 J/cm2. Considering as becoming extent is desirable. Moreover, ****** [as an exposure ambient atmosphere of an activity energy line] under the inert gas ambient atmosphere in the inside of air which it is good and are nitrogen, an argon, etc.

[0040] the back light of this invention was shown in drawing 1 -- as -- one end face (plane of incidence) of a transparent material 7 -- the light source 5 of a fluorescent lamp etc. -- arranging -- the plane of incidence of a transparent material 7, and abbreviation -- the lens sheet 1 with which many prism trains 2 which are the above, and were made and acquired were formed in parallel on the perpendicular outgoing radiation side is laid, and it is constituted. The plane of incidence of the light source 5 and a transparent material 7 is constituted so that it may cover with the case and film 6 which applied the reflective agent inside. Moreover, the lens sheet 1 with which the prism train 2 was formed through the

diffusion sheet 4 on the outgoing radiation side is usually laid in a transparent material 7, and a reflecting layer 3 is formed in an outgoing radiation side and the field of the opposite side with a reflective film etc. The installation direction to the transparent material 7 of the lens sheet 1 can be laid so that the lens side may serve as which direction of a top or the bottom, and it is suitably chosen by the property of a transparent material 7, a back light, etc. It may be used in the back light of this invention, carrying out the laminating of two or more lens sheet 1. In this case, it is used, carrying out a laminating so that the lens train 2 of each lens sheet 1 may make an include angle or may be parallel. In the back light of this invention, it is desirable to lay so that the lens train 2 of an at least one lens sheet may become parallel to the light source 5.

[0041] In the back light of this invention, it is not limited to the configuration shown in drawing 1 , and can consider as various configurations according to the purpose of use etc. For example, although what is necessary is just to arrange the light source 5 at at least one edge of a transparent material 7, two or more light sources 5 can also be arranged if needed. Moreover, the outgoing radiation side of a transparent material 7 or its opposite side may be formed in the diffusing surface or a lens side, and a quantity of light adjustment device in which a beam of light carries out outgoing radiation to homogeneity from the whole outgoing radiation side of a transparent material 7 by printing etc. may be given. Furthermore, the thing of various configurations, such as the shape of a sheet, a cross-section wedge shape, and a model of a ship, can be used for the configuration of a transparent material 7.

[0042]

[Example] Hereafter, an example explains this invention concretely. In the example, the transparency of an activity energy-line hardenability constituent observed the obtained constituent visually, and evaluated it by the following criteria.

O : it is transparent.

x: Muddiness is and is cloudy.

The impregnation workability of an activity energy-line hardenability constituent was evaluated by the following criteria about the impregnation to the metal mold of a constituent, and the lamination activity of a transparence base material.

O : the workability of impregnation and a lamination is good.

x: Contamination, such as a bubble, happens in the case of impregnation and a lamination.

[0043] The refractive index of the lens section pours the obtained activity energy-line hardenability constituent into the inside which formed the glass plate (3mm in the diameter of 65mm, and thickness) of two sheets for the 1mm gap, and fixed the periphery on the polyester tape, irradiates ultraviolet rays for 50 seconds using the high-pressure mercury lamp of 6.4kw (80W/(cm)), and is 10 J/cm2. Ultraviolet rays are irradiated, and are stiffened and a resin plate is manufactured. The refractive index in 20 degrees C according the obtained resin plate to the sodium D line light source was measured using the ABBE refractive-index meter.

[0044] The brightness of a back light laid the obtained lens sheet through the diffusion film on the outgoing radiation side of the transparent material made of acrylic resin which has arranged the cold cathode tube as shown in drawing 1 , set

the luminance meter (BMby TOPCON CORP. 7 mold) to the place 1m right above a back light, measured brightness, and showed it by the brightness ratio when setting the brightness when not carrying out lens sheet use to 1. the adhesion of the transparence base material of a prism sheet and the lens section attached at a time 11 blemishes to which even a transparence base material reaches a lens side with a razor in all directions at intervals of 1.5mm, and formed 100 measure eyes. then, the cellophane tape with a width of face of 25mm was stuck to the lens side, the cellophane tape was removed rapidly, and the measure eye to which it did not separate at that time was counted.

[0045] After mixing the compound shown in one to examples 1-6 and example of comparison 4 table 1, it agitated at 50 degrees C and uniform mixed liquor (ultraviolet-rays hardenability constituent) was obtained. After pouring into the lens mold of the abbreviation A4 size made from brass which has the lens pattern which formed many pitch 50micrometers and prism trains of 95 degrees of vertical angles for the obtained mixed liquor in parallel and spreading all over a lens mold, the transparence base material of the abbreviation A4 size shown in Table 1 was piled up. Subsequently, the high-pressure mercury lamp of 6.4kw(s) (80 W/cm) installed in the location of 300mm of upper parts of a transparence base material is used, and addition energy is 1.2 J/cm2. Ultraviolet rays were irradiated for 6 seconds so that it might become, the ultraviolet-rays hardenability constituent was stiffened, it exfoliated from the lens mold, and the prism sheet was obtained. Using the ultraviolet-rays hardenability constituent and prism sheet which were obtained, evaluation of transparency, impregnation workability, a refractive index, brightness, and adhesion was performed, and the result was shown in Table 2.

[0046] Superposition and a 3 moremm stainless plate were laid on top of the lens mold used in the example of comparison 5 example 1 for the polymethylmethacrylate film with a thickness of 0.8mm. Subsequently, after leaving it for 3 hours, having applied [50t] it equally, heating at 180 degrees C, it cooled, exfoliated from the lens mold and the prism sheet was obtained. Using the ultraviolet-rays hardenability constituent and prism sheet which were obtained, evaluation of transparency, impregnation workability, a refractive index, brightness, and adhesion was performed, and the result was shown in Table 2.

[0047]

[Table 1]

	活性エネルギー線硬化性組成物（g）									透明基材
	A成分	B成分			C成分		D成分			
	MPSMA	EPM-1	EPM-2	BPA-5	BnSA	CBnSA	TPO	BTPO	HNPO	
実施例1	45	25	-	-	-	30	2	-	-	PET
〃 2	60	-	20	-	20	-	-	2	-	PET
〃 3	30	-	-	60	-	10	-	-	2	PET
〃 4	50	-	15	-	-	35	-	2	-	PET
〃 5	45	25	-	-	-	30	2	-	-	PMMA
〃 6	45	25	-	-	-	30	2	-	-	PC
比較例1	-	60	-	-	-	40	2	-	-	PET
〃 2	95	-	-	-	-	5	2	-	-	PET
〃 3	50	50	-	-	-	-	2	-	-	PET
〃 4	10	10	-	-	-	80	2	-	-	PET
〃 5	-	-	-	-	-	-	-	-	-	PMMA

[0048]
[Table 2]

	透明性	作業性	屈折率	輝度比	密着性
実施例1	○	○	1.64	1.65	100
〃 2	○	○	1.67	1.66	100
〃 3	○	○	1.61	1.59	100
〃 4	○	○	1.66	1.65	100
〃 5	○	○	1.64	1.65	100
〃 6	○	○	1.64	1.65	100
比較例1	○	○	1.59	1.46	100
〃 2	×	×	測定不能	測定不能	100
〃 3	○	×	1.64	1.61	100
〃 4	○	○	1.62	1.51	100
〃 5	−	−	1.49	1.39	100

[0049] The cable address which showed front Naka and a compound is as follows.
[0050] MPSMA : A screw Epoxy methacrylate EPM-2 which the sulfide EPM-1:one mol (YD[by Tohto Kasei Co., Ltd.]- 8125) equivalent [of bisphenol A mold epoxy] and 2.1 mol [of methacrylic acids] equivalent was made to react, and compounded it : Tetrabromobisphenol A mold epoxy (Methacryloyl thiophenyl) Epoxy methacrylate BPM-5:2 and 2-screw (4-methacryloyloxy pentaethoxy phenyl) propane BnSA which the one-mol equivalent and the 2.1 mol equivalent of methacrylic acids were made to react, and compounded them (YD[by Tohto Kasei Co., Ltd.]- 360) : 2-benzyl thio ethyl acrylate CBnSA:2- Ethyl methacrylate TPO

(4'-chloro benzyl thio) : 2 4, 6-trimethyl benzoyl diphenyl phosphine oxide BTPO : Screw (2, 6-dimethoxybenzoyl) - 2, 4, and 4-trimethyl pentyl phosphine oxide HMPO : 2-hydroxy-2-methyl-1-phenyl propane-1-ON PET : Polyethylene terephthalate film (188 micrometers in thickness, Toyobo Co., Ltd. make A4100) PMMA : the poly methyl meta-crate resin sheet (0.8mm in thickness, the bitter taste rewrite L by Mitsubishi Rayon Co., Ltd.)
PC : polycarbonate resin sheet (0.5mm in thickness, Mitsubishi Gas Chemical Co., Inc. make)
[0051]
[Effect of the Invention] This invention can offer the back light whose transverse-plane brightness improved while the lens sheet which was excellent in the imprint precision of the thickness control nature of a lens sheet and a lens configuration, and was excellent in transparency, workability, and adhesion is obtained by forming the lens section in the front face of a transparence base material using a specific activity energy-line hardenability constituent.

[Translation done.]